

Table 4

	Example 2	Comparative Experiment C
Average particle size (micron)	76	76
density of suspension (kg/m <sup>3</sup> )	4	4
primary cyclone inlet velocity (m/s)	20	20
upwardly superficial gas velocity in primary cyclone (m/s)	0.3	0.3
separation in-efficiency of the primary cyclone	0.02%	0.2%
separation in-efficiency of the combined primary and secondary cyclones	0.5 ppm	3 ppm
pressure-drop (Pascal)	3300	3500

When increasing the superficial gas velocity to values above the 0.3 m/s as illustrated in Example 2 and Comparative Experiment C it is observed that at about 0.4 m/s the apparatus of Experiment C showed a sudden strong decrease in separation efficiency. This sudden strong decrease in separation efficiency was only observed at a substantial higher superficial gas velocity with the apparatus of Example 2.

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NEW SET OF CLAIMS

1. Apparatus for separating solid particles from a suspension of solid particles and vapour, wherein the apparatus comprises:

5 (i) a vertical primary cyclone vessel having a tubular housing comprising of a tubular wall section provided with a tangentially arranged inlet for receiving the particles and vapour, and which tubular wall section is open at its lower end and closed at its upper end by means of a cover provided with an opening, wherein the opening is fluidly connected to a gas outlet conduit, which conduit has a gas inlet opening located at the same level as the opening in the cover;

10 (ii) one or more secondary gas-solids separator means which are fluidly connected with the gas outlet conduit of the primary cyclone.

15 2. Apparatus according to claim 1, wherein the gas inlet opening of the gas outlet conduit is located at a distance (d1) above the centre of the tangentially arranged inlet opening and wherein the ratio of this distance and the diameter of the tubular housing (d2) is between 0.2 and 3.

20 3. Apparatus according to any one of claims 1-2, wherein the secondary gas-solid separator means is a cyclone separator.

25 4. Apparatus according to any one of claims 1-3, wherein a stripping zone provided with means to supply stripping gas is present, so arranged that in use a fluidized bed is present, located such that part or all of the stripping gas leaving the stripping zone in an upward direction enters the lower end of the primary cyclone.

5. Apparatus according to claim 4, wherein a vortex stabiliser is provided at the interface between the primary cyclone and the stripping zone.

5 6. Apparatus according to any one of claims 4-5, wherein the primary cyclone vessel and the stripping zone together form one tubular vessel, wherein in use, all of the stripping gas will be discharged from the stripping zone via the primary cyclone to the gas outlet conduit of the primary cyclone.

10 7. Apparatus according to any one of claims 4-5, wherein the primary cyclone, secondary cyclone(s) and the stripping zone are located in a reactor vessel having a larger diameter than the primary cyclone, wherein the reactor vessel is also provided with means to supply the suspension of catalytic particles and vapour and means to discharge stripped catalyst and vapours essentially free of catalyst particles.

15 8. Apparatus according any one of claims 1-3, wherein a dipleg is present at the lower end of the tubular wall section of the primary cyclone, which dipleg is fluidly connected to the tubular wall section by means of a frusto conical wall section.

20 9. Fluidized catalytic cracking reactor vessel comprising an apparatus according to claim 8, wherein a downstream end of a reactor riser is in fluid communication with the tangentially arranged inlet of the primary cyclone, the vessel further comprising at its lower end a stripping zone provided with means to supply a stripping medium to a dense fluidized bed of separated catalyst particles, means to discharge stripped catalyst particles from the vessel and means to discharge the hydrocarbon and stripping medium vapours from the vessel.

25 10. Vessel according to claim 9, wherein the gas outlet conduit of the primary cyclone is provided with an